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ABSTRACT

The idea of "capacity" is particularly important in the reform of educational systems because the system can be both the initiator and the subject of change. In fact, the requirement for capacity is present at all levels of the system in systemic reform. In educational change, four types of capacity are generally considered: (1) human capacity; (2) organizational capacity; (3) structural capacity; and (4) material capacity. Because there are so many types of capacity, evaluators may find a general organizing structure for looking at capacity useful before they set out to identify specific questions and indicators for evaluating capacity. A matrix is provided to allow evaluators to focus on the different types of capacity as "drivers" of targeted studies designed to match the more immediate strategies and goals of the reform. Examining capacity is one of the ways educational evaluators and researchers can examine reform efforts more thoroughly. (Contains 8 references.)(SLD)

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Determining Capacity Within Systemic Educational Reform

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Introduction

Systemic reform is a newly developing approach to educational improvement that is generating new language for the practice and study of educational reform. "Capacity" has become part of this evolving lexicon. While not entirely new to the language of educational change, "capacity" has adopted more rich, complex meanings in the systemic reform arena. Spillane and Thompson write that current reforms are "even more dependent on local capacity than were past waves of reform" (Spillane & Thompson, 1997) suggesting that capacity has matured from a mere descriptor of a person or program to become one of the core attributes of the systemic reform process. In its evolution, capacity has opened new doors and created new challenges for evaluators.

The Importance of Capacity in the Context of Systemic Change

Past reforms in mathematics and science have most often targeted programmatic areas of the education system such as changes in curriculum, teaching practices, or assessments. Evaluators then determine the value of these reforms by assessing the extent to which the target curricula, teaching practices or assessments are used and understood. Systemic reforms, one could argue, are different. In addition to such programmatic goals, systemic efforts focus on long-term time lines, promote reflection and strategic improvement, and hold the expectation that change will be continuous. Therefore, they can be described as having two domains of goals - programmatic goals (like conventional reforms) and goals targeted to building capacity for continuous change and improvement (Century, 1997).

This notion of working toward continuous change is not unique to education. In writing about business systems McAdams suggests that an organization with capacity is one that is "agile". By agility, he means that it can enrich the customer, cooperate to enhance competitiveness, organize to master change and uncertainty and leverage the impact of people and information (McAdams, 1997). It is not difficult to see how such "agility" might be desirable for an education system undergoing a mathematics or science systemic reform process.

Evaluators, then, face a new challenge in evaluating systemic reform. Given the dual domains of goals, a comprehensive evaluation of a mathematics or science systemic reform should include more than

recognizing the current status of a program and making judgments on that program's worth. It also needs to identify and assess the *capacity* of the program leaders, the participants, and the system itself for maintaining the program into the future and for facilitating steady, continued improvement.

Capacity is also particularly pertinent in systemic reform because in it, the system can be both the initiator and the subject of change. The notion that "the changer is the changee" (St. John, 1996) meaning, that those who are responsible for initiating and implementing the change are also among the subjects of the change, is a key idea in systemic reform. Such reforms depart from a more conventional model of having outside "experts" (e.g. universities or professional organizations) facilitate changes in others (schools, districts and states). Although systems can purchase technical assistance from external sources, ideally, leaders of reforms within the system ultimately must have the capacity to make the reform happen. Furthermore, the system itself must have the capacity to embrace the reform and support its continuous development. This raises significant challenges for the evaluator in considering whether the system is capable of, or inclined to change itself and in turn, how successful the systemic reform is likely to be.

The requirement for capacity is present at all levels of the system in systemic reform. Linda Darling Hammond writes that systemic reform is a "changed mission" for education that requires a "new model for school reform, one in which policy makers shift their efforts from designing controls intended to direct the system, to developing the capacity of schools and teachers to be responsible for student learning and responsive to student and community needs, interests and concerns." She points out that instead of standardizing practice, school reforms must "focus on building the capacity of schools and teachers to undertake tasks they have never before been called upon to accomplish" (Darling-Hammond, 1993).

The challenge for evaluators, then, is multifaceted. They must turn their attention to judging the capacities of the individuals leading and participating in the reform, and they must judge the capacity of the system itself. Because evaluators need to look at such a wide range of contexts for capacity it is important to first establish a clear understanding of what capacity is and how to describe and define it. Following is an organizational framework for defining capacity that can help organize a capacity study as part of a comprehensive systemic reform evaluation.

Current Understandings and Definitions of Capacity

In a most general sense, capacity refers to an entity's (an individual, group of individuals, system, etc.) ability to achieve the goals of a reform. In traditional improvement programs, this may simply refer to a university's ability to carry out a professional development program for teachers, or a state's ability to establish a new policy. In systemic reform, however, meanings of "capacity" have proliferated to encompass the various components and proponents of the reform as well as newly emerging goals and roles. Understanding these multiple definitions is necessary groundwork for fully understanding and making use of strategies for evaluating capacity.

The literature on educational change holds a range of descriptions of capacity, some of which reflect increased attention to the systemic context. Spillane and Thompson, for example, conducted a study which identified three components of a system's (a school district) capacity for change: human capital, social capital, and financial resources. By their definition, human capital refers to the commitment, disposition and knowledge of local reformers; social capital refers to the relations among individuals in a group or organization both with each other and those outside the district and financial resources refers to those resources allocated to staffing, time and materials (Spillane & Thompson, 1997). Their work illustrates how shifting from a traditional reform effort to a systemic one that is district-wide and long-lasting calls for a commensurate shift from a simple to a multi-faceted definition of capacity. This paper draws from this and other descriptions of capacity by organizing its multiple definitions into four broad categories: human capacity, organizational capacity, structural capacity, and material capacity.

1) Human Capacity

Human capacity is comprised of two parts: intellectual proficiency and will. Intellectual proficiency encompasses the knowledge, expertise and understanding that the people leading and engaged in the mathematics or science systemic reform must hold. Will is comprised of the interest, patience and persistence necessary to implement a mathematics or science systemic reform. Ideally, every group with an interest or stake in improving the mathematics or science program in a system must have sufficient

human capacity to carry out its requisite role. In systemic reform, such groups are many and may include: teachers, school administrators, central office administrators, university faculty, business owners, and students.

Evaluators, then, need to identify and assess the characteristics that indicate high human capacity in the individuals in each group. It is unlikely that any systemic reform effort will have a full complement of high capacity individuals at the outset; some groups within the reform may have few high capacity individuals, while others may have many. The key is that the high capacity individuals are at strategic points in the reform, and that there is evidence that human capacity will continue to grow.

2) Organizational Capacity

Organizational capacity refers to the interaction, collaboration, and communication among individuals in the system. Assume that an education system (whether a state or a district) is comprised of individuals in organizational structures. One can not assume that the overall organizational capacity is equal to the sum of the human capacities of the individuals that make it up. Rather, the *interactions* individuals have with one another shape a culture; a tone for collaboration and a means of communication that together comprise their organizational capacity. Some may under-emphasize the importance of giving attention to organizational capacity, but according to McAdams, although change is often viewed as a rational process, "in reality organizations change only when the people in them are willing and able to do so... one can say that an organization needs to be recultured before it can be restructured." (McAdams, 1997)

3) Structural Capacity

Structural capacity is defined as the elements of the system which exist independent of the human beings who may use or change those elements in order to function in the system. Such elements include policies, procedures and formalized practices such as: curriculum frameworks; professional development program designs; teacher certification policies; hiring practices; curriculum adoption procedures; formal procedures for collaboration amongst central office personnel; and formal partnerships between universities and the school system.

In looking at these characteristics of the system, the evaluator needs to consider more than the simple presence of a structure in the system. Evaluators also need to assess the quality of each element and its likelihood for sustainability. Even if highly visible, a structural element that is of low quality, or that is difficult to maintain should not be considered as favorable for capacity. It may represent a sort of "temporary" capacity, but can not warrant serious consideration in the long-term context of systemic reform.

4) Material Capacity

Material capacity is comprised of the fiscal resources and other material supports available to the reform and to the mathematics or science program in the system. Financial resources include funds external to the system's (e.g. district or state) budget (if there are any) as well as those funds allocated internally to support the reform and the mathematics or science program. Other material supports can take many forms and include storage and meeting space, instructional materials, supplemental curriculum resources, transportation, meeting supports, and technological capability.

Evaluators need to identify the existing resources and supports that come from within, and from outside the system and consider the extent to which those supports are likely to continue. Evaluating financial capacity may include a close look at reallocation of dollars within the system or identifying potential for obtaining resources in the future.

Interactions Between, and Interdependence of the Various Capacities

Spillane and Thompson note that the various capacities of a system are intertwined and that growth in one area depends closely on growth in another (Spillane & Thompson, 1997). The interdependence of these aspects of capacity, it seems, reflects the interdependence of the components of a reform effort as a whole. Understanding these relationships is key for evaluating and drawing accurate conclusions about capacity.

Consider human and organizational capacity. One might conclude that a system with high human capacity is likely to have high organizational capacity as well. However, this may not necessarily be the

case; a system may have high capacity individuals who fail to communicate or collaborate. Without a complementary organizational capacity, the high level of human capacity isn't completely realized in the system as a whole.

Likewise, material capacity and structural capacity are interdependent. An evaluator may identify a well-targeted policy or well-designed professional development plan, and then find that there are insufficient resources to carry it out. Or, perhaps there may be sufficient resources but the human capacity is inadequate to carry out the program or the policy. There is a limit to the extent to which any single capacity can contribute to the overall capacity of a system without depending on, and building on the other capacities.

The notion of alignment offers some insight into consideration of the overall capacity of a system. Each kind of capacity represents increased ability of the system to achieve its goals but, as mentioned above, when a capacity operates in the absence of others, the ultimate benefits are limited. In theory, when capacities are aligned, they can bring benefits to the system which far exceed the total of benefits they might bring separately — they create the opportunity for a continuous learning organization to grow and develop. One might call this collective view of capacity the "fitness" of the system for change.

The field of computer science offers a different but compatible interpretation of capacity which is referred to as "performance evaluation". Alexander Voss suggests that performance can be defined "as a sum of properties of a system that make it fit for a specific purpose." He refers to the individual properties as "performance indices" with performance the weighted sum of these indices. In this model, Voss explains, performance is "limited by the weakest link in the chain, in computer science termed a bottleneck..." Similarly, the whole capacity of a system can be limited by an insufficient capacity in any single area (Voss, 1998).

Organizing for Evaluating Capacity in Systemic Reform

Because there are so many different aspects of capacity, evaluators may find a general organizing structure for looking at capacity of use before they set out to identify specific questions and indicators for evaluating capacity. Consider a matrix which plots what might be called "subsystems" of the system against the different kinds of capacities:

	Human Capacity	Organizational Capacity	Structural Capacity	Material Capacity
Policy Subsystem		possible targeted study		
Instruction Subsystem	possible targeted study			possible targeted study
Management Subsystem			possible targeted study	

Using this matrix, evaluators can focus on the different types of capacity (human, organizational, structural and material) as "drivers" of targeted studies designed to match the more immediate strategies and goals of the reform. Each kind of capacity has many facets; evaluators need to identify and focus on the most significant ones in order to direct their resources most appropriately. Below are some examples of ways to target studies organized by types of capacity.

Human Capacity

One of the complicating factors in looking at human capacity is the wide range of people involved in a systemic effort. Evaluators need to know what central office administrators with capacity look like; what a science or mathematics supervisor with capacity looks like; and what a teacher or a principal with capacity looks like. Such capacity could take many forms including: access to other professionals, the ability to be self-reflective, the ability to facilitate thoughtful, reflective work in others, and knowledge of the discipline and of the pedagogical strategies desired in the reform. Evaluators will need to use a range of methodologies to systematically identify these qualities in the individuals participating in each subsystem of the system.

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Goertz and others offer one framework for organizing this task. This framework identifies four components of the capacity of teachers (and applies primarily to the instructional subsystem), though it can apply to any of the individuals in each of the subsystems. The first two components are "knowledge and skills," and include understanding of and expertise in subject matter, pedagogy, and instructional practice. Their third component is "will" which others have referred to as "disposition" or inclination (Spillane & Thompson, 1997). Will includes attitudes toward a discipline, toward students, toward student achievement, and the commitment to student learning (Goertz, et al., 1995). Additionally, will includes the attitude individuals have toward change and reform. The fourth component is "views of self" which refers to individuals' beliefs about their roles in reform activities, and the persona they adopt in the classroom or the office (Goertz, et al 1995). In a reform that requires leaders and participants to be learners themselves, this view of self is critical. These four dimensions are interdependent and interactive in that changes along one dimension can produce unexpected changes in another (Goertz et al., 1995).

Organizational Capacity

Assessment of organizational capacity also can have many dimensions. Evaluators need to consider organizational substructures in a system, the organizational structure of the system as a whole, the system's interactions with other organizational units, and their abilities to all work together. One general way to organize a study of organizational capacity is to divide it into two general areas: internal relationships and external relationships.

Internal relationships refer to the interactions between various individuals within an organization. In a school district, for example, they include the relationships the teachers have with one another, the relationships between the teachers and principals, the relationships between the principals and the central office, and so on. An organization with high capacity will have relationships that include open, regular communication, access to one another, opportunities for collaboration, common language, and shared vision and goals. Evaluators can use a range of strategies to gather data in these areas including interview, survey and observation.

External relationships refer to those relationships between individuals within an organizational unit of an education system (such as a district or a state) and individuals outside that organization. Outside individuals might include parents, local businesses, community organizations, and institutions of higher education. Entities such as these can sometimes be an important source of expertise and support that contribute to the system's current and growing capacity. However, evaluators must look at more than the system's ability to communicate with these entities; they also must ask questions which focus on their knowledge, skills and expertise for if they themselves have little capacity, they are not likely to help the system.

The literature offers other ways to think about organizational capacity. O'Day and others, for example, discuss organizational capacity in five areas: 1) Vision and Leadership; 2) Collective Commitment and Cultural Norms (to realize the vision); 3) Knowledge or Access to Knowledge; 4) Organizational Structures and Management (conducive to learning and improvement); and 5) Resources (O'Day et al., 1995). Although the classification scheme in this paper groups some of these areas with other capacities, evaluators may wish to develop composite definitions of capacity that are most meaningful to them. The classification itself isn't of the most importance; the primary goal is to organize a study of capacity which will help the evaluator come to some meaningful conclusions.

Structural Capacity

Evaluators may wish to focus a study of "Structural Capacity" by dividing it into two categories: content and process. Content related elements are those that reflect the philosophy and substance of the reform including curriculum, assessments, professional development programs, and existing and emerging policies that serve as scaffolds for change (teacher certification policies, hiring policies, etc.). Process elements are those structures that allow for the change to happen, but are somewhat content-free including: scheduled time for reflecting on changes and considering improvements, processes for making adjustments to the school improvement programs based on feedback from students and schools, and forums for open communication among and between administrative offices and schools.

Material Capacity

Financial resources could be assessed by looking at various documents including budgets, descriptions of allocation of funding sources, grant applications and use of grant moneys, and by studying the organization and use of materials.

Of course there are other ways to use the matrix. For example, evaluators could move horizontally across the matrix, looking at the human, organizational, structural and material capacities of each subsystem. With this approach, looking at each cell, the evaluator must consider both, the systemic *reform effort*, and the *system itself*. This is the best way to ensure that judgments about the likelihood of continuous growth are accurate, as the leaders and primary participants of the reform may not necessarily represent the leadership and population of the system as a whole (at least not at first). Even though reform leaders may have high capacity to manage the reform and even the skills to manage the larger system, those who are actually in system positions of leadership may not be as capable.

	Human Capacity	Organizational Capacity	Structural Capacity	Material Capacity
Policy Subsystem		reform effort *and* the overall system		
Instruction Subsystem	reform effort *and* the overall system			reform effort *and* the overall system
Management Subsystem			reform effort *and* the overall system	

Challenges for Identifying and Assessing Capacity in Systemic Reform

Finally, even after an evaluator has an organizing structure that works, there are other challenges to consider. For example, even though capacity may exist or be developing, one may not necessarily be able to see it at the time of evaluation. A teacher may have increased his/her understanding of high quality mathematics pedagogy and instructional materials (increased human capacity) but still not yet have changed his/her classroom practice (evidence of that increased capacity). The evaluator will need to consider not only what capacity looks like at a given moment but also what capacity looks like when it is in the process of growing.

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A second challenge lies in the fact that although evidence of capacity may be present at any given time in a reform, that evidence may not necessarily demonstrate whether that capacity will continue to grow. For example, a community or state may have a policy that *mandates* a high-quality standards-based curriculum (evidence of current structural capacity). That, however, is quite different than having a policy that *creates the conditions* for a curriculum selection process that will allow adoption of standards-based curriculum well into the future (evidence that capacity may continue to grow). Practices that seem effective for the moment may not contribute to the growth of capacity in the future.

And finally, capacity may be judged in many ways, using many different questions or indicators. Therefore, there is no single scale by which capacity can be measured. Evaluators need to decide whether to judge capacity in light of the goals of the reform, by a theoretical ideal, or on the change in capacity over time.

Facing these and other challenges, evaluation of capacity within the context of systemic reform is a formidable task. But, it also is an exciting one. With the turn in the evolution of educational change theory to include systemic reform also comes an opportunity for educational evaluators to explore new ideas, tools, strategies and insights to bring to the educational change process. Educational evaluators and researchers are up to this challenge; we simply need to recognize that *we* have the capacity to look at our work and the work of systemic reform with the new, innovative eyes it requires.

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